

**MULTIMEDIA**



**UNIVERSITY**

**STUDENT ID NO**

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

**TRIMESTER 3, 2018/2019**

**BFN2104 – CORPORATE FINANCE**

( All sections / Groups )

**29 MAY 2019**

**9.00 a.m – 11.00 a.m**

**( 2 Hours )**

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### INSTRUCTIONS TO STUDENTS

1. This question paper consists of SEVEN (7) printed pages with four (4) questions, financial tables and formula sheet.
2. Attempt ALL questions.
3. Please write all your answer in the Answer Booklet provided.
4. Marks are shown at the end of each question.

**STRUCTURED QUESTIONS (100 Marks)**

There are **FOUR (4)** questions in this section. Candidates **MUST** answer **ALL** questions.

**Question 1 (25 Marks)**

- (a) Superb Bhd. has 9.3 million shares of common stock outstanding and 260,000 6.8 percent semiannual bonds outstanding, par value RM1,000 each. The common stock currently sells for RM34 per share and has a beta of 1.20, and the bonds have 20 years to maturity and sell for 104 percent of par. The market risk premium is 7 percent, T-bills are yielding 3.5 percent, and Superb Bhd's tax rate is 35 percent.

- i. What is the firm's market value capital structure?

(5 marks)

- ii. If Superb Bhd. is evaluating a new investment project that has the same risk as the firm's typical project, what rate should the firm use to discount the project's cash flows?

(5 marks)

- (b) Makcik Nasi Lemak owns three identical restaurants popular for their specialty nasi lemak. Each restaurant has a debt-equity ratio of 40 percent and makes interest payments of RM41,000 at the end of each year. The cost of the firm's levered equity is 19 percent. Each store estimates that annual sales will be RM1.3 million; annual cost of goods sold will be RM670,000; and annual general and administrative costs will be RM405,000. These cash flows are expected to remain the same forever. The corporate tax rate is 40 percent.

- i. Use the flow to equity approach to determine the value of the company's equity.

(10 marks)

- ii. What is the total value of the company?

(5 marks)

Continued...

**Question 2 (25 Marks)**

- (a) Security F has an expected return of 10 percent and a standard deviation of 43 percent per year. Security G has an expected return of 15 percent and a standard deviation of 62 percent per year.

- i. What is the expected return on a portfolio composed of 30 percent of Security F and 70 percent of Security G?

(3 marks)

- ii. If the correlation between the returns of Security F and Security G is 0.25, what is the standard deviation of the portfolio described in part (a)?

(4 marks)

- (b) Your portfolio is comprised of 20% of stock A, 70% of stock B, and 10% of stock C. Stock A has a beta of 0.82, stock B has a beta of 1.62, and stock C has a beta of 1.08. What is the beta of your portfolio?

(4 marks)

- (c) Mulia Bhd has been a hot stock the last few years, but is risky. The expected returns for Mulia Bhd are highly dependent on the state of the economy as follows. Compute the expected return based on the data given in Table A.

**Table A:**

State of Economy	Probability	Mulia Bhd's Returns
Depression	0.05	-50%
Recession	0.1	-15%
Mild slowdown	0.2	5%
Normal	0.3	15%
Broad Expansion	0.2	25%
Strong Expansion	0.15	40%

(5 marks)

Continued...

- (d) Suppose the expected returns and standard deviations of Stocks A and B are  $E(R_A) = 0.09$ ,  $E(R_B) = 0.15$ ,  $\sigma_A = 0.36$ , and  $\sigma_B = 0.62$ .

Calculate the expected return and standard deviation of a portfolio that is composed of 35 percent A and 65 percent B when the correlation between the returns on A and B is 0.5.

(9 marks)

**Question 3 (25 Marks)**

- (a) Levered Bhd., and Unlevered, Bhd., are identical in every way except their capital structures. Each company expects to earn RM23 million before interest per year in perpetuity, with each company distributing all its earnings as dividends. Levered's perpetual debt has a market value of RM73 million and costs 8 percent per year. Levered has 2.1 million shares outstanding, currently worth RM105 per share. Unlevered has no debt and 4.5 million shares outstanding, currently worth RM78 per share. Neither firm pays taxes. Is Levered's stock a better buy than Unlevered's stock? Please justify your answer with detailed analysis.

(12 marks)

- (b) Your portfolio has a beta of 1.18. The portfolio consists of 15% U.S. Treasury bills, 30% in stock A, and 55% in stock B. The beta of a risk-free asset is zero. The beta of the market is 1.0. Stock A has a risk-level equivalent to that of the overall market. What is the beta of stock B?

(5 marks)

- (c) Rolston Corporation is comparing two different capital structures, an all-equity plan (Plan I) and a levered plan (Plan II). Under Plan I, Rolston would have 265,000 shares of stock outstanding. Under Plan II, there would be 185,000 shares of stock outstanding and RM2.8 million in debt outstanding. The interest rate on the debt is 10 percent and there are no taxes.

- i. If EBIT is RM750,000, which plan will result in the higher EPS?

(4 marks)

- ii. If EBIT is RM1,500,000, which plan will result in the higher EPS?

(4 marks)

Continued...

**Question 4 (25 Marks)**

(a) Consider the following financial statement information for the Cerdik Bhd.:

	Beginning	Ending
Inventory	RM17,385	RM19,108
Accounts receivable	13,182	13,973
Accounts payable	15,385	16,676
Net sales	RM216,384	
Cost of goods sold	165,763	

- i. Compute the company's average age of inventory (AAI). (5 marks)
  - ii. Compute the company's average collection period (ACP). (5 marks)
  - iii. Calculate the operating cycle (OC) and cash cycles. How do you interpret your answer? (10 marks)
- (b) In working capital management, there are some actions that increase or decrease cash. What are some of the items that *increase* the cash account, respectively? (5 marks)

End of Page

Present Value and Future Value Tables

Table A-1 Future Value Interest Factors for One Dollar Compounded at  $k$  Percent for  $n$  Periods:  $FVIF_{k,n} = (1 + k)^n$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000	1.2400	1.2500	1.3000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100	1.2321	1.2544	1.2769	1.2996	1.3225	1.3456	1.4400	1.5376	1.5625	1.6900
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950	1.3310	1.3676	1.4049	1.4429	1.4815	1.5209	1.5609	1.7280	1.9066	1.9531	2.1970
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641	1.5181	1.5735	1.6305	1.6890	1.7490	1.8106	2.0736	2.3642	2.4414	2.8561
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105	1.6851	1.7623	1.8424	1.9254	2.0114	2.1003	2.4883	2.9316	3.0518	3.7129
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7715	1.8704	1.9738	2.0820	2.1950	2.3131	2.4364	2.9860	3.6352	3.8147	4.9268
7	1.0721	1.1487	1.2289	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280	1.9487	2.0762	2.2107	2.3526	2.5023	2.6600	2.8262	3.5832	4.5077	4.7684	6.2749
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926	2.1436	2.3045	2.4760	2.6584	2.8526	3.0590	3.2784	4.2998	5.5895	5.9605	8.1573
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719	2.3579	2.5580	2.7731	3.0040	3.2519	3.5179	3.8030	5.1598	6.9310	7.4506	10.604
10	1.1046	1.2190	1.3438	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674	2.5937	2.8394	3.1058	3.3946	3.7072	4.0456	4.4114	6.1917	8.5944	9.3132	13.786
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804	2.8531	3.1518	3.4785	3.8359	4.2262	4.6524	5.1173	7.4301	10.657	11.642	17.922
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127	3.1384	3.4985	3.8960	4.3346	4.8178	5.3503	5.9360	8.9161	13.215	14.552	23.298
13	1.1381	1.2936	1.4685	1.6651	1.8858	2.1329	2.4098	2.7195	3.0558	3.4253	3.8333	4.2835	4.7900	5.3564	5.9888	6.6928	10.699	16.386	18.190	30.288
14	1.1495	1.3195	1.5128	1.7317	1.9799	2.2603	2.5785	2.9372	3.3417	3.7975	4.3104	4.8871	5.5348	6.2613	7.0757	7.9875	12.839	20.319	22.747	39.374
15	1.1610	1.3459	1.5580	1.8009	2.0769	2.3966	2.7590	3.1722	3.6425	4.1772	4.7844	5.4736	6.2543	7.1379	8.1371	9.2655	15.407	25.166	28.422	51.186
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703	4.5950	5.3109	6.1304	7.0673	8.1372	9.3676	10.748	18.488	31.243	35.527	66.542
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1688	3.7000	4.3276	5.0545	5.8951	6.8660	7.9861	9.2785	10.761	12.468	22.186	38.741	44.409	86.504
18	1.1961	1.4282	1.7024	2.0268	2.4066	2.8543	3.3799	3.9960	4.7171	5.5599	6.5436	7.6900	9.0243	10.575	12.375	14.463	26.623	48.039	55.511	112.455
19	1.2081	1.4568	1.7536	2.1088	2.5270	3.0256	3.6165	4.3157	5.1417	6.1169	7.2633	8.6128	10.197	12.056	14.232	16.777	31.948	59.568	69.389	146.192
20	1.2202	1.4859	1.8011	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044	6.7275	8.0623	9.6463	11.523	13.743	16.367	19.461	38.338	73.864	86.736	190.050
21	1.2324	1.5157	1.8503	2.2788	2.7860	3.3996	4.1408	5.0338	6.1088	7.4002	8.9492	10.804	13.021	15.688	18.822	22.574	46.005	81.592	108.420	247.065
22	1.2447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586	8.1403	9.9336	12.100	14.714	17.961	21.845	26.186	55.205	113.574	135.525	321.164
23	1.2572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579	8.9543	11.025	13.552	16.627	20.362	24.891	30.378	66.247	140.831	168.407	417.539
24	1.2697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111	9.8497	12.239	15.179	18.788	23.212	28.625	35.238	79.497	174.631	211.758	542.801
25	1.2824	1.6406	2.0938	2.6668	3.3864	4.2919	5.4274	6.8485	8.6231	10.835	13.585	17.000	21.231	26.462	32.918	40.874	95.398	218.542	264.898	705.641
30	1.3478	1.8114	2.4273	3.2434	4.3219	5.7435	7.8123	10.063	13.286	17.449	22.892	29.960	39.116	50.950	66.212	86.850	237.376	634.820	807.794	*
35	1.4166	1.9959	2.8139	3.9461	5.5160	7.6861	10.677	14.785	20.414	28.102	38.575	52.800	72.069	98.100	133.176	180.314	590.668	*	*	*
40	1.4889	2.2080	3.2820	4.8010	7.0400	10.286	14.974	21.725	31.409	45.259	65.001	93.051	132.782	188.884	267.864	378.721	*	*	*	*
50	1.6446	2.6916	4.3839	7.1067	11.467	18.420	29.457	46.902	74.358	117.391	184.565	285.002	450.736	700.233	*	*	*	*	*	*

Table A-2 Future Value Interest Factors for a One-Dollar Annuity Compounded at  $k$  Percent for  $n$  Periods:  $FVIFA_{k,n} = [(1 + k)^n - 1] / k$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	26%	30%
1	1.0000	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000	1.2400	1.2500	1.3000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900	2.1000	2.1100	2.1200	2.1300	2.1400	2.1500	2.1600	2.2000	2.2400	2.2500	2.3000
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781	3.3100	3.3421	3.3744	3.4069	3.4396	3.4725	3.5056	3.6400	3.7776	3.8125	3.9900
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5051	4.5713	4.6410	4.7097	4.7793	4.8498	4.9211	4.9934	5.0665	5.3680	5.6842	5.7656	6.1870
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847	6.1061	6.2278	6.3528	6.4803	6.6101	6.7424	6.8771	7.4416	8.0484	8.2070	9.0431
6	6.1520	6.3081	6.4664	6.6300	6.8019	6.9753	7.1533	7.3369	7.5233	7.7166	7.9129	8.1152	8.3227	8.5355	8.7537	8.9775	9.9299	10.960	11.259	12.756
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004	9.4877	9.7833	10.088	10.405	10.730	11.057	11.414	12.916	14.615	15.073	17.583
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.260	10.637	11.028	11.436	11.859	12.297	12.751	13.233	13.727	14.240	16.499	18.123	18.842	23.858
9	9.3685	9.7546	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.778	15.416	16.085	16.786	17.519	20.799	24.712	25.802	32.015
10	10.462	10.950	11.484	12.005	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420	19.337	20.304	21.321	25.959	31.843	33.293	42.619
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814	23.045	24.349	25.733	32.150	40.238	42.586	56.406
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650	27.271	29.002	30.850	39.581	50.895	54.208	74.327
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	29.985	32.089	34.352	36.786	48.497	64.110	68.760	97.625
14	14.947	15.974	17.088	18.292	19.599	21.015	22.550	24.215	26.019	27.976	30.095	32.393	34.883	37.581	40.505	43.672	58.196	80.496	86.949	127.913
15	16.097	17.293	18.589	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417	43.842	47.580	51.660	72.035	100.816	109.887	167.286
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	46.672	50.980	55.717	60.925	87.442	126.011	136.109	218.472
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	44.501	48.884	53.739	59.118	65.075	71.673	105.931	157.253	173.636	285.014
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	61.725	68.394	75.836	84.141	128.117	195.994	218.045	371.518
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939	63.440	70.749	78.969	88.212	98.603	154.740	244.033	273.556	483.973
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	80.947	91.025	102.444	115.380	186.868	303.601	342.945	630.165
21	23.239	25.783	28.676	31.969	35.719	39.993	44.865	50.423	56.765	64.002	72.265	81.699	92.470	104.768	118.810	134.841	225.026	377.465	429.681	820.215
22	24.472	27.299	30.537	34.248	38.505	43.392	49.006	55.457	62.873	71.403	81.214	92.503	105.491	120.436	137.632	157.415	271.031	469.058	538.101	*
23	25.716	28.845	32.453	36.618	41.430	46.996	53.436	60.893	69.532	79.543	91.148	104.603	120.205	138.297	159.276	183.601	326.237	582.530	673.626	*
24	26.973	30.422	34.426	39.083	44.502	50.816	58.177	66.765	76.790	88.497	102.174	118.155	136.831	158.669	184.168	213.978	392.484	723.461	843.033	*
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.413	133.334	155.620	181.871	212.793	249.214	471.981	898.092	*	*
30	34.785	40.568	47.575	56.085	66.549	79.058	94.461	113.283	136.308	164.994	199.021	241.333	293.199	356.787	434.745	530.312	*	*	*	*
35	41.680	49.994	60.462	73.652	90.320	111.435	138.237	172.317	215.711	271.024	341.590	431.663	546.681	693.573	881.170	*	*	*	*	*
36	43.077	51.994	63.276	77.598	95.836	119.121	148.913	187.102	236.125	299.127	380.164	484.463	618.749	791.673	*	*	*	*	*	*
40	48.886	60.402	75.401	95.026	120.800	154.762	199.635	259.057	337.882	442.693	581.826	767.091	*	*	*	*	*	*	*	*
50	64.663	84.579	112.797	152.667	208.348	290.336	406.529	573.770	815.084	*	*	*	*	*	*	*	*	*	*	*

Present Value and Future Value Tables

Table A-3 Present Value Interest Factors for One Dollar Discounted at  $k$  Percent for  $n$  Periods:  $PVIF_{k,n} = 1 / (1 + k)^n$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432	0.6944	0.6504	0.6400	0.5917
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407	0.5787	0.5245	0.5120	0.4552
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523	0.4823	0.4230	0.4096	0.3501
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761	0.4019	0.3411	0.3277	0.2693
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104	0.3349	0.2751	0.2621	0.2072
7	0.9327	0.8706	0.8131	0.7593	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538	0.2791	0.2218	0.2097	0.1594
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050	0.2326	0.1789	0.1678	0.1226
9	0.9143	0.8368	0.7664	0.7026	0.6448	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630	0.1938	0.1443	0.1342	0.0943
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267	0.1616	0.1164	0.1074	0.0725
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2368	0.2149	0.1954	0.1346	0.0938	0.0869	0.0558
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685	0.1122	0.0757	0.0687	0.0429
13	0.8787	0.7730	0.6810	0.6005	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2576	0.2292	0.2042	0.1821	0.1625	0.1452	0.0935	0.0610	0.0550	0.0330
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252	0.0779	0.0492	0.0440	0.0254
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1078	0.0649	0.0397	0.0362	0.0185
16	0.8528	0.7284	0.6232	0.5338	0.4581	0.3936	0.3387	0.2919	0.2519	0.2178	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930	0.0541	0.0320	0.0281	0.0150
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311	0.1978	0.1686	0.1436	0.1252	0.1078	0.0929	0.0802	0.0451	0.0258	0.0225	0.0118
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691	0.0376	0.0205	0.0180	0.0089
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2755	0.2317	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596	0.0313	0.0164	0.0144	0.0068
20	0.8195	0.6730	0.5537	0.4584	0.3789	0.3138	0.2584	0.2145	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514	0.0261	0.0135	0.0115	0.0053
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443	0.0217	0.0109	0.0092	0.0040
22	0.8034	0.6468	0.5219	0.4200	0.3418	0.2775	0.2257	0.1839	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382	0.0181	0.0088	0.0074	0.0031
23	0.7954	0.6342	0.5067	0.4057	0.3286	0.2651	0.2139	0.1720	0.1398	0.1135	0.0917	0.0738	0.0601	0.0491	0.0402	0.0329	0.0161	0.0071	0.0059	0.0024
24	0.7876	0.6217	0.4919	0.3901	0.3130	0.2507	0.1997	0.1577	0.1254	0.1016	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284	0.0126	0.0057	0.0047	0.0018
25	0.7798	0.6095	0.4776	0.3751	0.2983	0.2360	0.1842	0.1420	0.1100	0.0883	0.0703	0.0568	0.0451	0.0378	0.0304	0.0245	0.0105	0.0046	0.0038	0.0014
30	0.7419	0.5521	0.4120	0.3083	0.2314	0.1741	0.1314	0.0984	0.0754	0.0573	0.0437	0.0334	0.0256	0.0196	0.0151	0.0118	0.0042	0.0016	0.0012	*
35	0.7059	0.5000	0.3554	0.2534	0.1813	0.1301	0.0937	0.0678	0.0490	0.0356	0.0269	0.0189	0.0139	0.0102	0.0075	0.0055	0.0017	0.0005	*	*
36	0.6999	0.4902	0.3450	0.2437	0.1727	0.1227	0.0875	0.0626	0.0449	0.0323	0.0234	0.0169	0.0123	0.0089	0.0065	0.0048	0.0014	*	*	*
40	0.6717	0.4529	0.3086	0.2083	0.1420	0.0972	0.0688	0.0480	0.0338	0.0221	0.0154	0.0107	0.0075	0.0053	0.0037	0.0026	0.0007	*	*	*
50	0.6082	0.3715	0.2281	0.1407	0.0872	0.0543	0.0339	0.0213	0.0134	0.0085	0.0054	0.0035	0.0022	0.0014	0.0009	0.0006	*	*	*	*

Table A-4 Present Value Interest Factors for a One-Dollar Annuity Discounted at  $k$  Percent for  $n$  Periods:  $PVIFA = [1 - 1/(1 + k)^n] / k$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	28%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	1.9704	1.9418	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278	1.4568	1.4400	1.3809
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.1065	1.9813	1.9520	1.8161
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1698	3.1024	3.0373	2.9746	2.9137	2.8550	2.7982	2.5887	2.4043	2.3616	2.1662
5	4.8534	4.7135	4.5797	4.4518	4.3285	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906	2.7454	2.6893	2.4356
6	5.7965	5.6014	5.4172	5.2421	5.0757	4.9173	4.7666	4.6229	4.4859	4.3553	4.2305	4.1114	3.9976	3.8887	3.7845	3.6847	3.3255	3.0205	2.9514	2.6427
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.6046	3.2423	3.1611	2.8021
8	7.6517	7.3255	7.0197	6.7337	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7888	4.6308	4.4838	4.3436	3.8372	3.4212	3.3289	2.9247
9	8.5660	8.1622	7.8661	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6065	4.0310	3.5655	3.4631	3.0190
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8332	4.1926	3.6819	3.5705	3.0915
11	10.368	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0285	4.3271	3.7757	3.6564	3.1473
12	11.255	10.575	9.9640	9.3851	8.8533	8.3538	7.8927	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4208	5.1971	4.4392	3.8514	3.7261	3.1903
13	12.134	11.348	10.635	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3423	4.5327	3.9124	3.7801	3.2233
14	13.004	12.106	11.296	10.563	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3026	6.0021	5.7245	5.4675	4.6106	3.9616	3.8241	3.2487
15	13.865	12.849	11.938	11.118	10.360	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4634	6.1422	5.8474	5.5755	4.6755	4.0013	3.8593	3.2682
16	14.718	13.578	12.561	11.632	10.838	10.106	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6685	4.7296	4.0333	3.8874	3.2832
17	15.562	14.292	13.165	12.165	11.274	10.477	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	4.7746	4.0591	3.9099	3.2948
18	16.398	14.992	13.754	12.659	11.890	10.828	10.059	9.3719	8.7556	8.2014	7.7015	7.2497	6.8399	6.4674	6.1280	5.8178	4.8122	4.0799	3.9279	3.3037
19	17.226	15.678	14.324	13.134	12.085	11.168	10.336	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8775	4.8435	4.0967	3.9424	3.3105
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.8181	9.1285	8.5135	7.9333	7.4594	7.0248	6.6231	6.2593	5.9288	4.8696	4.1103	3.9539	3.3158
21	18.857	17.011	15.415	14.029	12.821	11.784	10.836	10.017	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	4.8913	4.1212	3.9631	3.3199
22	19.660	17.658	15.937	14.451	13.163	12.042	11.081	10.201	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	6.0113	4.9094	4.1300	3.9705	3.3230
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.5802	8.8932	8.2654	7.7184	7.2297	6.7921	6.3988	6.0442	4.9245	4.1371	3.9764	3.3254
24	21.243	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0726	4.9371	4.1428	3.9811	3.3272
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	6.0971	4.9476	4.1474	3.9849	3.3286
30	25.805	22.396	19.800	17.292	15.372	13.765	12.409	11.258	10.274	9.4269	8.6938	8.0552	7.4957	7.0027	6.5660	6.1752	4.9789	4.1601	3.9950	3.3321
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.6442	8.8552	8.1755	7.5856	7.0700	6.6166	6.2123	4.9915	4.1644	3.9984	3.3330
36	30.108	25.489	21.832	18.908	16.547	14.621	13.035	11.717	10.612	9.6765	8.8766	8.1924	7.5979	7.0790	6.6231	6.2201	4.9929	4.1649	3.9987	3.3331
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.7791	8.9511	8.2438	7.6344	7.1050	6.6418	6.2335	4.9966	4.1659	3.9995	3.3332
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.952	9.9148	9.0417	8.3045	7.6752	7.1327	6.6605	6.2463	4.9965	4.1666	3.9999	3.3333

# Standard List of Formulas

$$\text{COV}_{ab} = \sum (r_a - \bar{r}_a)(r_b - \bar{r}_b) \times P_r$$

$$\rho = \frac{\text{COV}_{a,b}}{\sigma_a \sigma_b}$$

$$\sigma_p^2 = w_a^2 \sigma_a^2 + w_b^2 \sigma_b^2 + 2(w_a \sigma_a w_b \sigma_b) \rho_{ab}$$

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2}$$

$$\beta_E = \beta_A(1 + \frac{D}{E})$$

$$B_0 = I \times \left[ \sum_{t=1}^n \frac{1}{(1+r_d)^t} \right] + M \times \left[ \frac{1}{(1+r_d)^n} \right]$$

$$r_n = \frac{D_1}{N_n} + g$$

$$r_d = \frac{I + \frac{\$1000 - N_d}{n}}{\frac{N_d + \$1000}{2}}$$